
Clock Controller maintenance

Clock operation

Tracking mode

In tracking mode, the DTI loop supplies an external clock reference to a Clock Controller. Two DTI loops can operate in tracking mode, with one defined as the primary reference source for clock synchronization, the other defined as the secondary reference source. The secondary reference acts as a back-up to the primary reference.

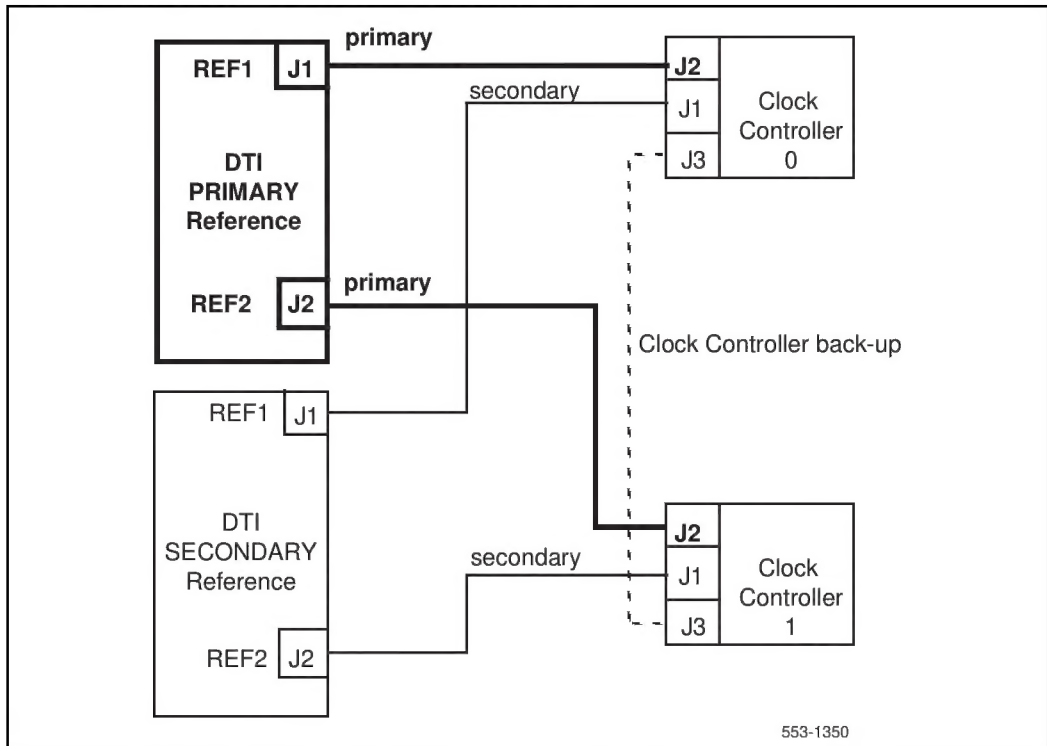
As shown in Figure 12, a Meridian 1 system with dual CPUs may have two Clock Controllers (CC0 and CC1). One Clock Controller acts as a back-up to the other. The Clock Controllers should be completely locked to the reference clock.

Free run (non-tracking) mode

The clock synchronization for a DTI loop may operate in free run mode if the following occurs:

- The loop is not defined as the primary or secondary clock reference.
- The primary and secondary references are disabled.
- The primary and secondary references are in red alarm (local alarm).

Figure 12
Clock Controller primary and secondary tracking



Reference clock errors

Meridian 1 software checks every 15 minutes to see if a Clock Controller or reference clock error has occurred.

In tracking mode, at any one time, there is one active Clock Controller that is tracking on one reference clock. If a Clock Controller error is detected, the system switches to the back-up Clock Controller, without affecting which reference clock is being tracked.

A reference clock error occurs when there is a problem with the clock driver or with the reference system clock at the far end. If the Clock Controller detects a reference clock error, the reference clocks are switched.

Automatic clock recovery

An option for automatic clock recovery can be selected in LD 60 with the command EREF.

A DTI loop is disabled when it enters a red alarm (local alarm) condition. If the red alarm is cleared, the loop is enabled automatically. When the loop is enabled, clock tracking is restored in the following conditions:

- If the loop is assigned as the primary reference clock but the Clock Controller is tracking on the secondary reference or in free run mode, it is restored to tracking on primary.
- If the loop is assigned as the secondary reference clock but the Clock Controller is in free run mode, it is restored to tracking on secondary.

If the 15-minute clock check indicates the system is in free run mode, the following occurs:

- Tracking is restored to the primary reference clock if defined.
- If the primary reference is disabled or in red alarm (local alarm), tracking is restored to the secondary reference clock if defined.

Automatic clock switching

If the EREF option is selected in LD 60, tracking on the primary or secondary reference clock is automatically switched in the following manner:

- If software is unable to track on the assigned primary reference clock, it switches to the secondary reference clock and sends appropriate DTC maintenance messages.
- If software is unable to track on the assigned secondary reference clock, it switches to free run.

Clock Controller commands (LD 60)

Table 14 lists Clock Controller commands.

Table 14
Clock Controller commands (LD 60)

Message	Description
DIS CC N	Disables specified system Clock Controller.
DSYL L	Disables yellow alarm (remote alarm) processing for loop L.
ENL CC N	Enables specified system Clock Controller.
ENYL L	Enables yellow alarm (remote alarm) processing for loop L.
EREF	Enables automatic switching and recovery of primary and secondary reference clocks when loops associated with these clocks are automatically enabled.
MREF	Disables automatic switching and recovery of the primary and secondary reference clocks when loops associated with these clocks are automatically disabled or in red alarm (local alarm).
SSCK N	Provides status of system clock N. Indicates the active controller as well as active primary or secondary reference clock source or free run.
SWCK	Switches the system clock from the active to the standby clock. The reference clock source remains unchanged.
TRCK xxx	Set Clock Controller tracking, where xxx is as follows: PCK track primary clock SCLK track secondary clock FRUN free run mode

The DTC messages indicate Clock Controller status and error conditions. They are listed in Table 15.

Table 15
DTCxxx messages

Message	Description
DTC001	Clock Controller tracking on primary source loop.
DTC002	Clock Controller tracking on secondary source loop.
DTC003	Clock Controller cannot be accessed.
DTC004	Clock Controller indicates clock aging error.
DTC005	Reference clock switched to secondary source from primary.
DTC006	Reference clock switched to free run mode from secondary or primary.
DTC007	Active reference clock is set to retrack primary.
DTC008	Active reference is free run or the Clock Controller cannot be accessed.
DTC009	Clock Controller has been switched.
DTC010	UART error is detected.
DTC011	Clock control self-test failed; error exists.
DTC012	Clock control has reference clock problem.
DTC013	Clock control has tracking problem.
DTC014	Clock control set to free run.
DTC015	Clock control set to secondary.
DTC016	Clock Controller restored from free run or secondary to tracking on primary.
DTC017	Clock Controller restored from free run to tracking on secondary.
DTC018	Cannot switch or restore to a reference clock because automatic reference clock switching option is disabled.

Replacing the Clock Controller

CAUTION

Firmly touch the metal frame of the cabinet to discharge static electricity from your body before handling cards.

Note: Do not deviate from this procedure. This procedure should not cause the system to SYSLOAD or initialize, but will stop call processing.

- 1 Ensure that the Clock Controller card being replaced is associated with the disabled CPU. Switch CPUs, if necessary:

LD 35
SCPU

- 2 Disable the Clock Controller card being replaced as follows:

LD 60
DIS CC

- 3 On the Clock Controller card being replaced, set the ENB/DIS switch to DIS.

- 4 Disconnect cables from the Clock Controller card being replaced.

- 5 Remove the card from the shelf.

- 6 Set the ENB/DIS switch to DIS on the Clock Controller card being added.

- 7 Ensure that the switch settings are correct.

- 8 Install the new Clock Controller card in the same slot as the defective card.

- 9 Reconnect cable(s) to the Clock Controller faceplate.

- 10 Set ENB/DIS switch on the new Clock Controller to ENB.

- 11 Enable the new Clock Controller card as follows:

LD 60
ENL CC N

- 12** Verify normal service level; first, switch the active clock to standby as follows:

LD 60
SWCK N

If an error message results, refer to the *X11 input/output guide* (553-3001-400) for the interpretation.

Note: Switching Clock Controllers using LD 60 will generate ERR20 messages. These can usually be ignored, but avoid excessive switching, especially when counters are near the maintenance or out-of-service thresholds. Excessive switching can generate maintenance or out-of-service threshold messages or cause the DTI to be disabled. Check the counters in LD 60. If necessary, reset the counters using the RCNT command.

Clock Controller switch settings

Switch settings for the QPC471 Clock Controller (vintages A, B, C, E, F, and G) and the QPC775 Clock Controller (currently available in Canada only) are given in Table 16. Switch settings for the QPC471 Clock Controller vintage H is given in Table 17.

Table 16
Clock Controller switch settings

System/Clock Controller	SW1	SW2	SW3	SW4 (1,2)	Jumper 1	Jumper 2
QPC471 A						
N, NT, RT	n/a	ON	n/a	n/a	n/a	n/a
XN, XT	n/a	OFF	n/a	n/a	n/a	n/a
QPC471 B through G						
ST, STE, 21, 21A, 21E	ON	OFF	n/a	n/a	TP8-TP9	TP11-TP12
MS	ON	ON	n/a	n/a	TP9-TP10	TP12-TP13
N, NT, RT, 51, 61	ON	OFF	n/a	n/a	TP8-TP9	TP11-TP12
XN, XT, 71	OFF	OFFN	n/a	n/a	TP8-TP9	TP11-TP12
QPC775						
N, NT, RT, ST, STE, 21, 21A, 21E, 51, 61	n/a	ON	OFF	ON	n/a	n/a
MS, SN	n/a	ON	ON	OFF	n/a	n/a
XN, XT, 71, 81	n/a	OFF	OFF	ON	n/a	n/a

Table 17
Clock Controller switch settings for QPC471 vintage H

System	SW1	SW2	SW4
ST, STE, 21, 21A, 21E	on on on on	off off off off	off off off off
MS, SN	on on on on	on on on on	off off off off
N, NT, RT, 51, 61	on on on on	off off off off	off on * *
XN, XT, 71, 81	off off off off	off off off off	off on * *
Cable length between the J3 faceplate connectors:			
0-4.3 m (0-14 ft)			off off
4.6-6.1 m (15-50 ft)			off on
6.4-10.1 m (21-33 ft)			on off
10.4-15.2 m (34-50 ft)			on on
* If there is only one Clock Controller card in the system, set to OFF. If there are two Clock Controller cards, set to the value determined by the cable length between the J3 faceplate connectors. Determine the total cable length (no single cable can exceed 25 ft) between the J3 connectors. Both cards must have the same setting.			

Clock Controller cabling

The Clock Controller cabling for various system configurations is shown in Figures 13, 14, and 15.

Figure 13
Clock Controller cabling: ST and N/NT/RT half-group

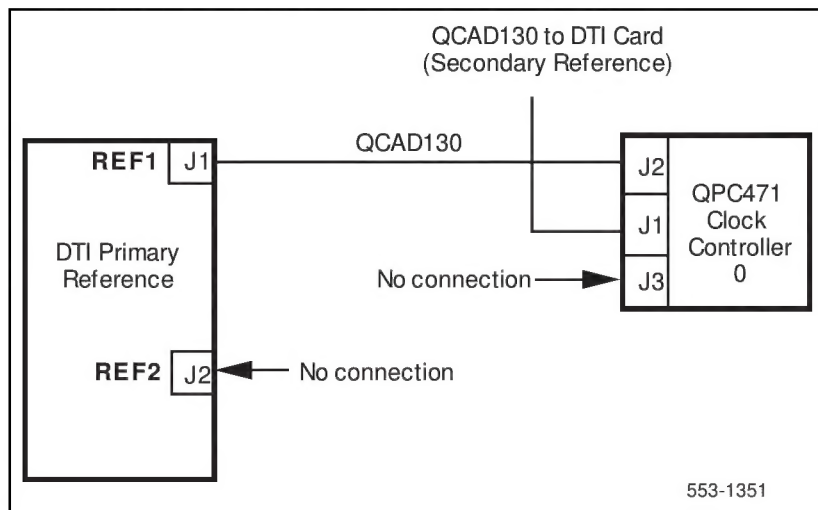


Figure 14
Clock Controller cabling: N/NT single-group

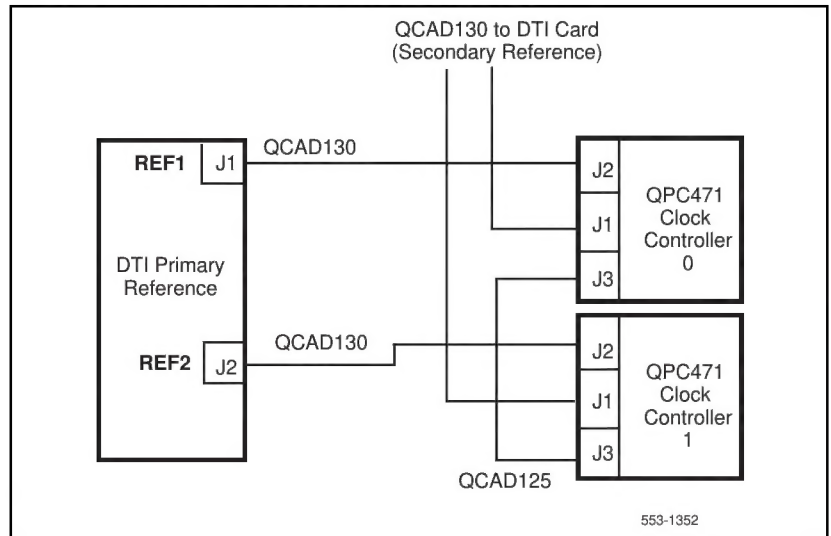
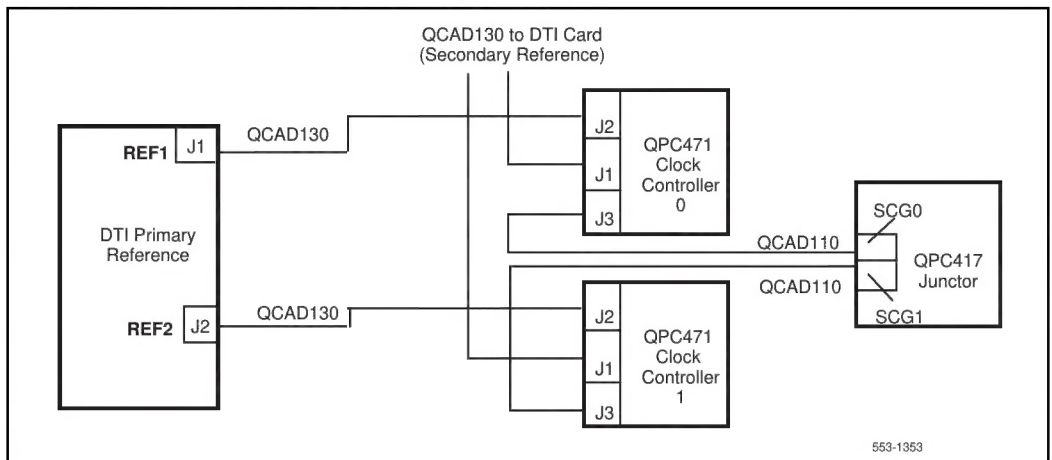


Figure 15
Clock Controller cabling: XN/XT multi-group



Meridian 1
**Digital Trunk Interface/
Computer-to-PBX Interface**
Maintenance

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